

MEMORANDUM FOR RECORD: Aerial Reconnaissance of Winooski River at Montpelier 25 Jan. 2007

Andy Tuthill surveyed ice conditions on the Winooski River in the vicinity of Montpelier, VT on the afternoon of 25 Jan. 2007. An unusual combination of above average river discharge followed by a week of very cold air temperatures had resulted in a freezeup ice jam downstream of the city. By Jan. 20 the ice accumulation had elevated stage at the Montpelier Gage by about 5 ft, causing basement flooding along the North Branch. The week-long cold period followed several months of above-average temperatures and high discharges. As a result, the sheet ice covers that typically form above Main St. Weir and the old Pioneer Dam were not in place to intercept drifting frazil ice from upstream. Instead, frazil ice drifted downstream through the city, adding to the downstream ice cover progressed upstream from Middlesex, reaching the Montpelier Gage by 18 Jan¹.

By Jan. 25, the Winooski ice cover had progressed upstream to the foot of the Main St. Weir. Above this point, the river was open for about 4 miles, past the Stevens Branch confluence to the head of the rapids below Levesque Station. This small hydro dam had a ¼ mile-long ice covered pool, which appeared to be intercepting frazil ice from the river upstream which was also open. Frazil ice could be seen drifting down the Winooski from the base of the rapids to the Main St. Dam. The frazil pans appeared slushy and dark in color with surface concentrations no greater than about 30 percent. The fact that the pans were relatively small and in low concentration is probably due to the limited length of the source reach.

The North Branch was ice covered from Montpelier to a point about half way to the Wrightsville Dam. In the open water section, border ice and visible anchor ice indicated that the North Branch water, if not super cooled, was quite near the freezing point only a short distance downstream of the dam. Based on these observations, releasing flow from Wrightsville Dam may not provide sufficient heat to melt out the jam below Montpelier. Still it would be worth measuring water temperatures at key locations on the North Branch and main stem Winooski to provide inputs to some basic heat transfer and melting calculations.

Although it was a very cold day (5 deg F at the time of the flight) no drifting frazil ice was visible on the Stevens Branch, which was open up from the confluence upstream beyond Barre. This suggests that most of the frazil ice still contributing to the Montpelier Jam originates in the 4-mile-long reach from Levesque Dam down to the Main St. Weir.

¹ The Middlesex ice cover forms most winters, usually reaching the Montpelier Gage by about mid-January. The difference is that this year, this downstream ice cover formed much more quickly and at a higher discharge. The higher discharge and greater ice supply produced a thicker rougher ice cover in the Cemetery Bend reach and unusually high stages in Montpelier.

The 3-ft decrease in stage since 20 Jan. at the Montpelier Gage indicates that the ice underside is smoothing or frazil slush is being carried downstream. The drop in water level at the gage could also result a decreasing trend in discharge since the high flow events earlier in the month. The drop in stage at the gage does not necessarily mean that water levels are dropping along the North Branch where basement flooding has been reported.

With the decreasing discharges and the continued cold forecast for at least another week, one would expect the formation of ice covers upstream of the Main St. Weir and the Pioneer Dam. These covers would limit further frazil ice deposition at downstream locations and provide temporary relief from the high stages currently being experienced in the city.

An important question is whether the freezeup ice jam now in place will potentially block passage of the breakup ice run and cause ice jam flooding later in the winter. On the positive side, the upstream ice supply reach is limited to 4 miles. Also, being late January, the days are getting longer and the remaining ice-growing period is limited to about 6 weeks. It will be important to monitor ice in and around Montpelier, especially as we approach the ice breakup season which typically occurs early to mid-March.

It would also be useful to collect data on characteristics of the freezeup ice accumulation in the Cemetery Bend Area. CRREL has agreed to assist in this effort on Thurs., 1 Feb along with Montpelier DPW personnel. A meeting is scheduled on Monday, 5 Feb. in Montpelier to discuss the situation, field observations and possible courses of action.

Respectfully Submitted,

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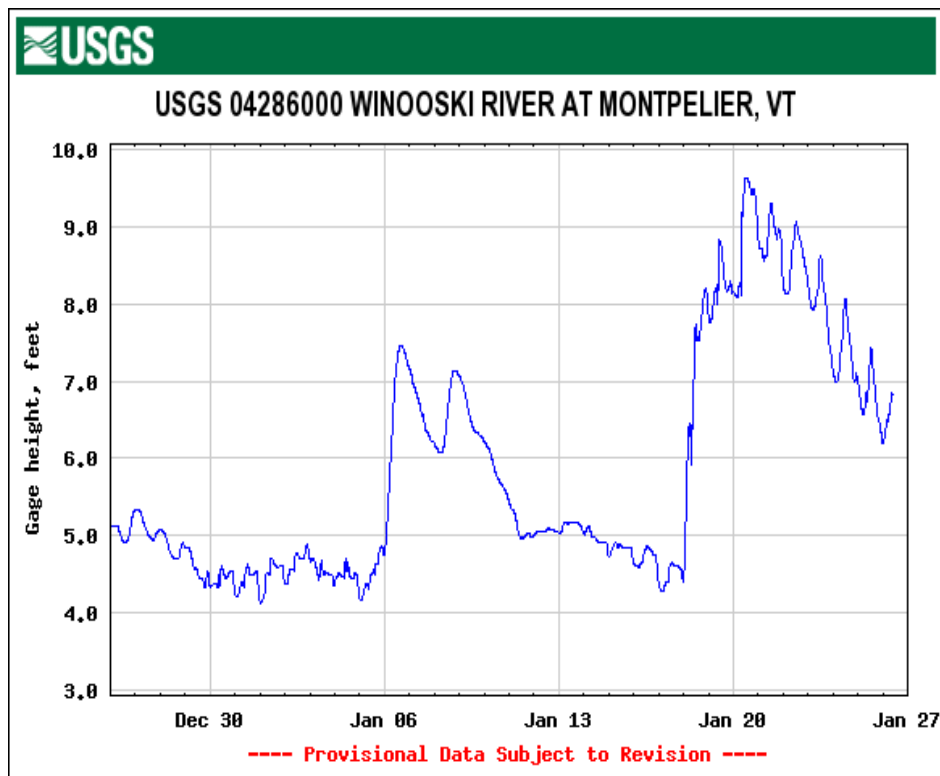
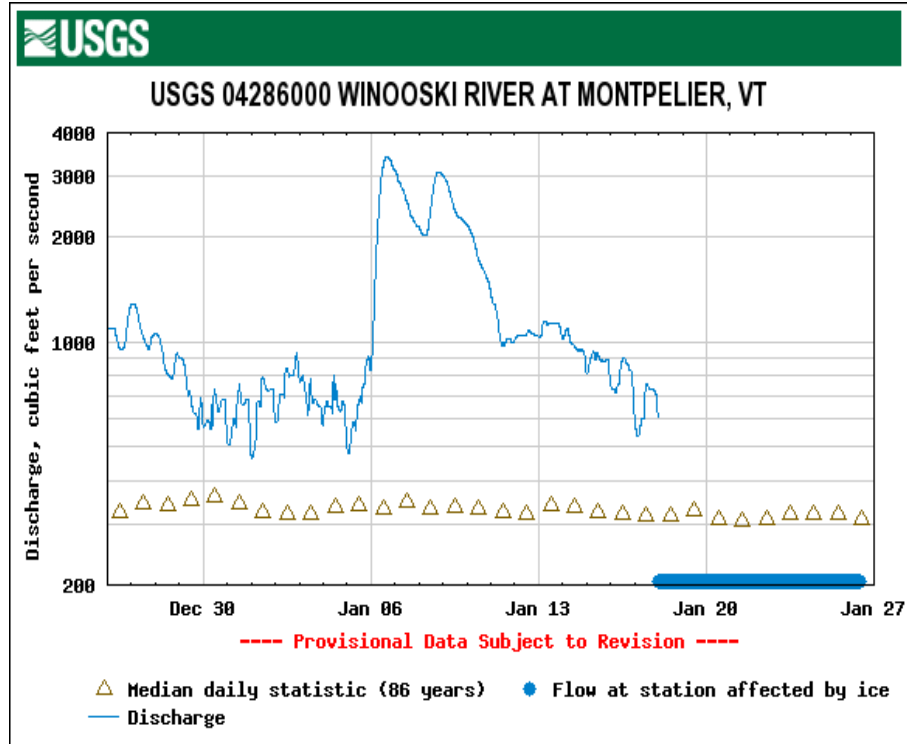


Fig. 1. Discharge and stage plots for the Montpelier gage. Note the discharge record stops on Jan. 18 when the ice accumulation reached the gage location.

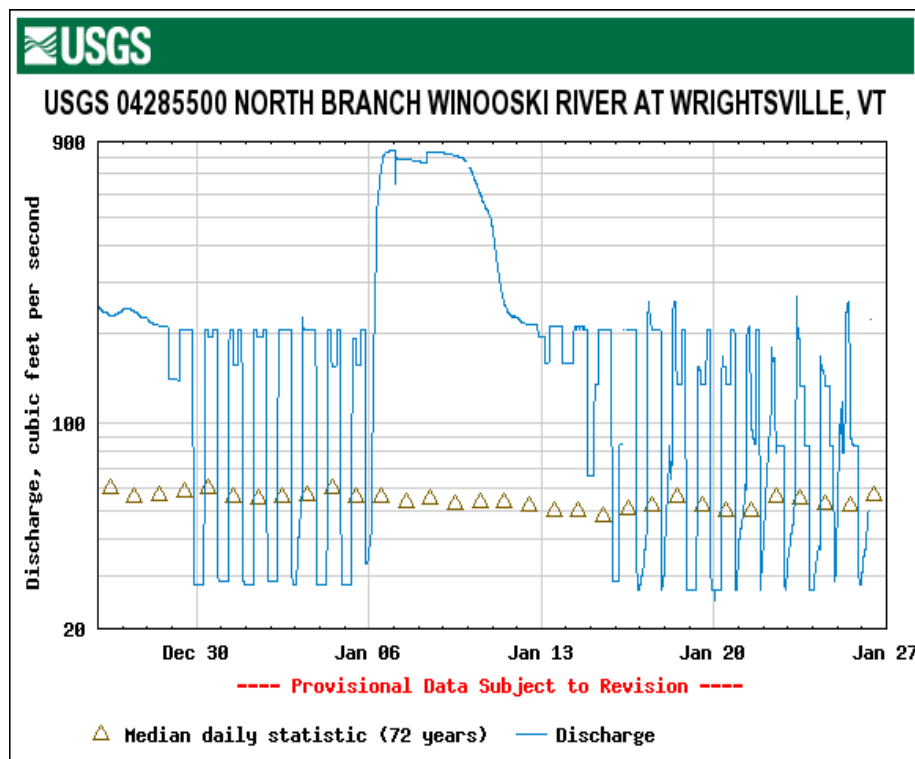
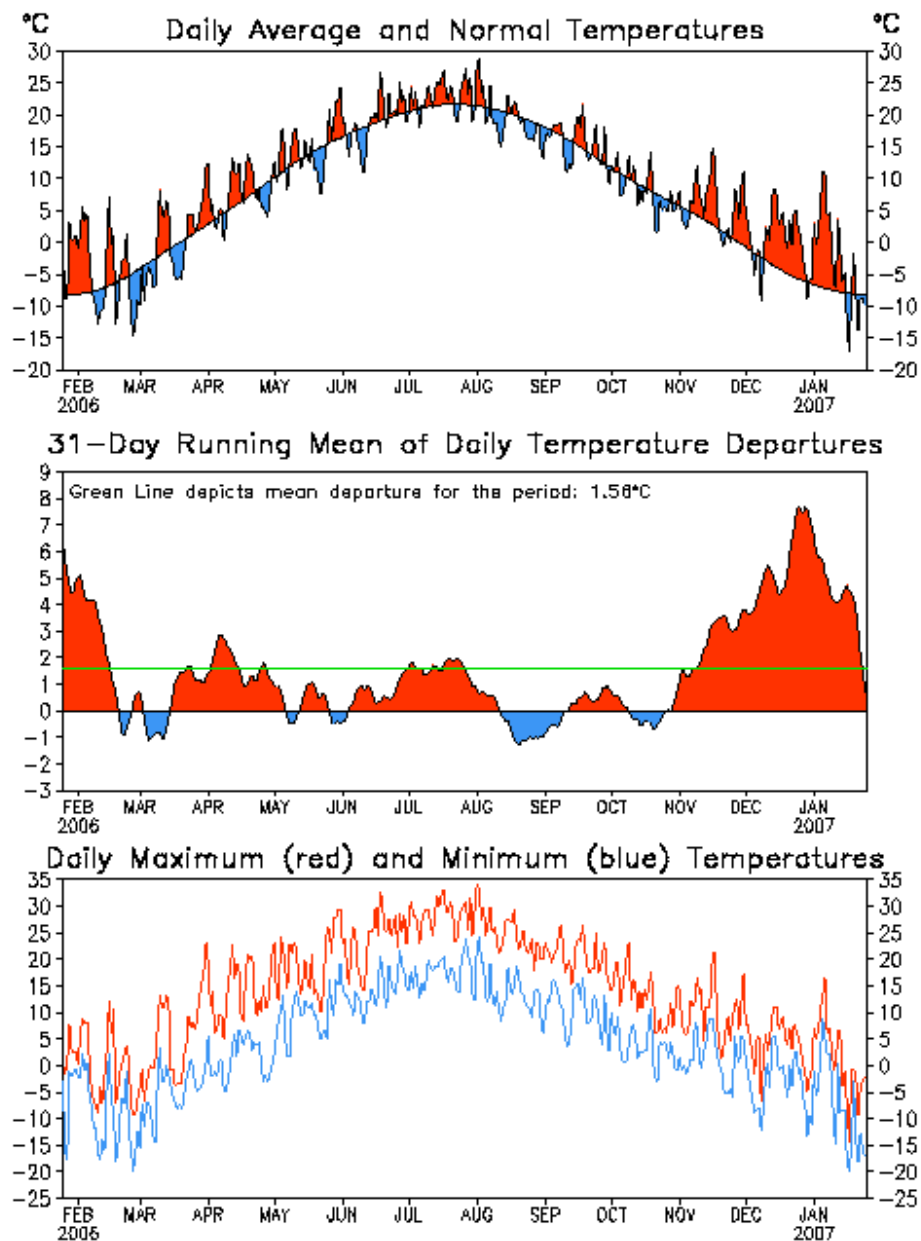


Fig. 2. Outflow from Wrightsville Dam.

BURLINGTON, VERMONT



Data updated through 24 JAN 2007

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Fig. 3. Burlington, VT air temperature compared to long-term averages. Note the abnormally warm temperatures through mid-January 2007.



Fig. 4. Looking upstream at the rapids section below Levesque Station.



Fig. 5. Frazil ice drifting past Stevens Branch Confluence. Flow direction is left to right.



Fig. 6. Frazil ice passing over Pioneer Dam. Flow is left to right.



Fig. 7. Ice cover in downtown Montpelier. Open water upstream of Main St. Dam.



Fig. 8. Looking upstream at ice accumulation in Cemetery Bend.



Fig. 9. Looking downstream towards Middlesex.



Fig. 10. Wrightsville Dam.



Fig. 11. Open water on North Branch below Wrightsville Dam.



Fig. 12. Ice cover on North Branch in Montpelier with open section below small weir.